Contractor:

SMART VISION CO.

Document Title:

WORK PLAN

Client:

Bank Albilad

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1. Overview

This Scope of Work (the "SOW") is to develop, permit, engineer, design, procure, construct, interconnection, commission, startup and test, turnkey photovoltaic facility which is built to a nameplate capacity of xxxxx KWp/ xxxxx KVA (AC) and which performs to an agreed upon Performance Guarantee for the project.

Smart vision (SV) will be responsible about any coordination with SEC (Saudi Electricity Company), and other authorities of jurisdiction.

SV will procure, all materials required to install and commission the PV system according to this SOW and the Project drawings and all applicable codes and standards.

System will be installed as car park and canopy structure, as specified by the RFP documents and client requirements which will achieve the capacity (xxx KVA) without effect on the surrounded areas in line with this RFP's requirements and which performs to an agreed upon System Performance Guarantee. The Project's works will be done based on the applicable codes, standards and publications applied in Jordan and international best practice. The design and implementation of the project will be ensured best practice in terms of Health & Safety of equipment and procedures, and duty of care throughout all stages of development. Where the structural engineering and design is based upon the requirements of the local standards along with data supplied by the module, inverter and racking manufacturer, the electrical engineering and design is based upon meeting the national electric code, ENA and SEC requirements. The technical staff will be responsible for providing any material, labor or services of any kind during the execution of the works. Also, the Works at site will follow set of technical standards IEEE

2. Engineering

SV will be responsible for all engineering and design Including operation and maintenance technical staff and required equipment, tools, and / or. measuring, testing and maintenance requirements ....etc. as needed.

SV will submit to Bank Al-bilad all design drawings, data and documents for review and comment. The drawings, data and documents will be submitted to Bank Albilad when they are deemed 90% complete by the SV.

A. Studies:

SV will use and take into consideration and comply with the outcome and requirements of Grid Connection study prepared by (SEC) or any other party appointed by the Employer and will be responsible to get all approvals to connect the power plant with the SEC.

SV will implement the following studies in addition to any other needed studies mentioned in tender documents:

1-Grid impact study.

2-Solar Production Studies and energy yields calculations including losses calculations to the point of connections at local internal grid.

3-Shading Studies.

SV will provide copies of all the above studies and any other studies proves to be needed or required which mentioned in RFP document, to the Engineer as well as reports once they become completed and issued in final forms.

B. Detailed Site Layout & Design:

It is the responsibility of SV to generate a site layout that specifies a Project with a nameplate AC capacity of XXXKVA. The DC portion of the Facility which is defined as the sum of the nameplate capacities of the solar modules under Standard Test Conditions shall not be less than XXXX KWp

The site layout includes the location of photovoltaic arrays, inverters, cable routes, and any other permanent features of the Project. Once the site layout drawings are approved by Bank Al-Bilad, SV will not make changes to the site layout drawings without Bank Albilad prior review and written approval.

SV will generate a site plan, which indicates the structural, and electrical Work that is required for the successful completion of the Project and for permitting.

C. Structural Engineering:

Structural analysis and design of photovoltaic arrays, mounting systems, concrete foundations, are the responsibility of SV. The design will be based upon the requirements, of the applicable codes, standards and permits as well as the data, supplied by the module, inverter, and racking supplies.

D. Electrical Engineering:

The Engineering works include carrying out full and detailed site visit and producing sites drawings and data that are required to develop all required designs. During preparation of design documents and drawings, The Comprehensive project design will be in accordance with International and local codes and standards that are consistent with PV power generation Industry Standards, Electricity Regulatory Commission, CE Conformity Declaration, Mechanical Stability IEC 61215,IEEE 1547-2003 "IEEE Standard for Interconnecting Distributed Resources with Electric Power), Electrical TUV, G59/2 code and the specifications and details stated in the Employer's Requirements.

The engineering and design will include the appropriate sizing of all cabling (above and below ground) that will connect the modules, arrays and inverters to the point of interconnection. All DC & AC cables will be copper cables, sizing of cables shall be derated as per ambient temp., grouping factor and soil resistivity.

All underground wiring and cables will be installed in trench with 0.6 m minimum depth. All protection equipment throughout the system will be sized and specified to reduce damage on all components and the interconnection point in case of electrical failure. Surge and over voltage protection, Intermittency protection.

The above ground portion of the electrical systems will be neatly routed to facilitate access,

troubleshooting, maintenance, etc.

The electrical design will include the design of equipment grounding, and lightning / surge protection (if necessary) for the plant. All monitoring and communication equipment and cabling will be designed and specified.

The design of the interconnected is described in the Interconnection Agreement. SV will design, procure, and install all the equipment which is needed to connect the plant to the local grid at Bank Albilad. SV will design, procure and install all the equipment which is needed to connect the plant to the local grid, also will design and specify all communications hardware and software required for system protection and remote monitoring.

SV will design procure and install any necessary power, communications and internet facilities required for solar system operation.

3. Procurement

Procurement and expediting tasks for all equipment and Materials are the responsibility of SV Such equipment includes the equipment in the compliance sheet and the Materials include such items as wire, cable, conduit, concrete, modules.

The equipment and Materials will be purchased by SV, and it is understood that the cost of this equipment and Materials, including the risk of any escalation in the price of such equipment and Materials, is included in the Contract Price.

SV will submit to Bank Al-Bilad the key vendor drawings and documents for information, review, and comment. Bank Al-Bilad will review and comment on such drawings. Vendor drawings that shall be submitted to Bank Al-Bilad when received by SV include, but are not limited to:

- Photovoltaics Panels
- Racking and Mounting System
- Monitoring systems

- Inverters
- Protection systems

4. Construction:

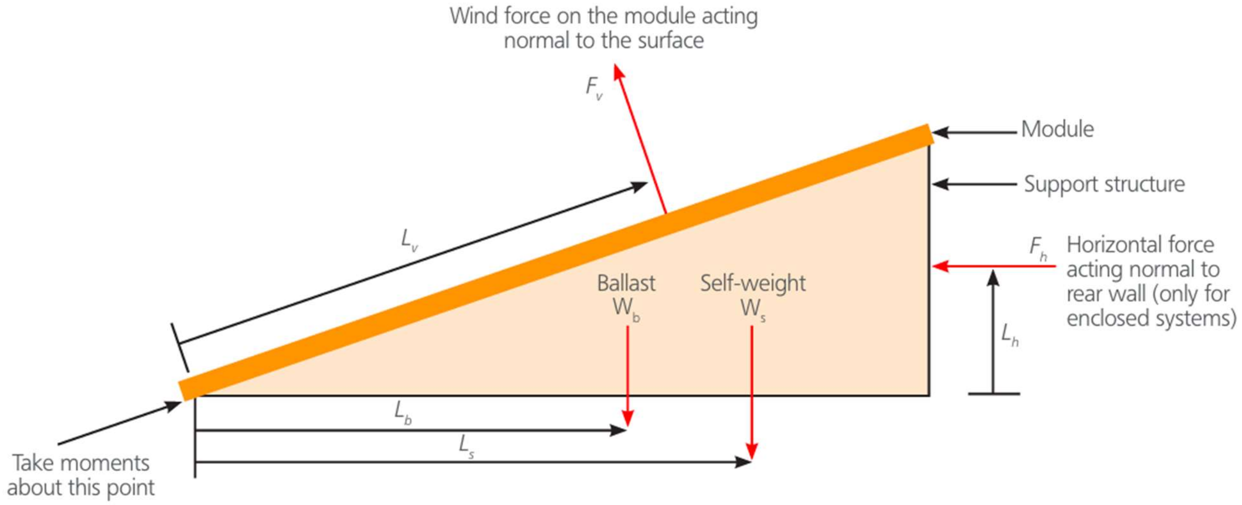
SV will build and execute the project and all the works necessary for making the project complete in every respect in accordance with the designs and drawings prepared by KE and approved by the SSIF.

It is the responsibility of SV to build all aspects of the project as depicted in the Project drawings and documents. This includes the electrical system from the modules through the point of delivery to Bank Al-Bilad. SV will also provide all temporary equipment, materials or facilities required to construct the Project and place it into operation.

The solar carport frame should be manufactured from corrosion resistant materials that are appropriate for the environment in which they are to be installed and that are suitable for the expected lifetime of the system. Galvanic effects should be considered when selecting a frame that uses components of different metals. The design should make allowances for thermal expansion and contraction i.e. providing expansion gaps in structures with long extrusions. In addition, the design and specification of the carport should prevent the accumulation of snow, ice, water and debris on the PV array.

All PV module clamping should be carried out in accordance with manufacturer's requirements.

Definition of forces and lever arms for overturning moments


Wind force on the module acting normal to the surface
F_v
Module
Support structure
F_h
Horizontal force acting normal to rear wall (only for enclosed systems)
L_v
Ballast W_b
Self-weight W_s
L_h
L_b
L_s
Take moments about this point

Loading

The carport structure, ground fixings, PV modules and mounting fixings need to be able to withstand all forces that are anticipated to be imposed on them throughout the lifetime of the system, as illustrated in figure above. Methods for calculating potential wind loads (including uplift, sliding and overturning momentum) vary depending on the type of car park.

The wind uplift force, calculated for each carport, will determine the quantity, location and pull-out strength of the ground and mounting fixings required. It is important to ensure that the fixing capacity provided by the manufacturer includes a safety factor, as this information can vary from product to product.

Foundations

In addition to the requirements stipulated by Part A of the Building Regulations, all foundation types should conform to BS 8004:2015 'Code of practice for foundation. Solar carport structures can be affixed to a surface car park, decision as to which method is suitable for a specific car park will come down to the site conditions ascertained by geotechnical data and investigations.

Surface car parks - soil structure, flooding, ground stability, surface finish and underground activities.

Critical Considerations for a Commercial Solar Carport

- Carport Size
- Clearance – The Space is below Your Solar Carport

- Decking: Controlling Water Runoff
- Snow Guards: Preventing Snow Slides
- Lighting: Keeping Things Bright

Step-by-Step Installation Process

Preparation Phase

1. Site Assessment and Planning

- **Survey the Site**: Conduct a site survey to determine the best orientation for the solar carport.
- **Check for Obstructions**: Ensure the location is free from trees, buildings, or other obstacles that could cast shadows on the solar panels.
- **Consider Weather Conditions**: Take local climate conditions (wind speed, snow load, etc.) into account when designing and choosing materials.
- **Verify Accessibility**: Ensure you have easy access for equipment, tools, and materials during the construction and installation process.

2. Material Procurement

- **Structure Materials**: Purchase the structural materials for the carport (steel or aluminum posts, beams, and supports), ensuring they are suitable for the local environment.
- **Solar Panel Kit**: Ensure the solar panel kit includes solar panels, mounting racks, inverters, wiring, and other electrical components.
- **Foundation Materials**: You may need concrete, gravel, rebar, post brackets, and anchor bolts for the foundation of the structure.

Installation Phase

1. Layout and Marking

- **Mark the Perimeter**: Use stakes and string lines to outline the perimeter of the carport and the positions of each post. Double-check the layout for proper alignment and symmetry.
- **Determine Post Spacing**: Space the posts appropriately based on the carport’s dimensions. Ensure the spacing accommodates both structural integrity and the required tilt for the solar panels.

2. Prepare the Foundation (Concrete Footings)

- **Excavate Post Holes**: Dig holes for the foundation. Typically, each post requires a hole that is 2-3 feet deep, depending on the size of the posts and local soil conditions.
- **Install Rebar**: Place rebar in the holes for added reinforcement. The rebar should extend vertically for securing the posts and horizontally to add strength to the foundation.
- **Set the Anchor Bolts**: Install anchor bolts or post mounts into the wet concrete, ensuring they align with the future placement of the posts.

- **Pour Concrete**: Pour concrete into the holes and smooth the surface. Allow the concrete to cure for at least 24-48 hours, depending on temperature and local conditions.

3. Install the Support Posts

- **Position the Posts**: After the concrete foundation has cured, attach the vertical posts to the anchor bolts. Use a level to ensure each post is plumb (perfectly vertical).
- **Secure the Posts**: Tighten bolts to secure each post firmly in place. Ensure they are spaced consistently and positioned in line with the marked layout.
- **Attach Horizontal Beams**: Install horizontal support beams across the posts. These beams will support the carport roof and solar panel mounting system. Use steel brackets or bolts to securely fasten the beams.

4. Construct the Roof Frame

- **Install Roof Beams**: Attach additional horizontal roof beams to create a framework that will support the roof. Depending on the design, this could involve sloping beams that will ultimately hold the solar panels.
- **Install Purlins**: These are horizontal beams that support the solar panels. The purlins should be evenly spaced and installed at the correct height to hold the solar panel mounting rails.

Solar Panel Installation

1. Mounting the Solar Panel Racks

- **Install Mounting Rails**: Mount the solar panel rails onto the purlins, ensuring they are level and secure.
- **Align the Panels**: Ensure the solar panel rails are spaced to fit the number of panels intended for installation.

2. Secure the Solar Panels

- **Install the Solar Panels**: Attach the solar panels to the mounted rails. Use the manufacturer's hardware (clamps, screws, etc.) to secure the panels, ensuring they are properly aligned and firmly fixed.
- **Check for Stability**: Double-check the stability of each panel. Make sure they are all securely attached to avoid shifting or damage due to wind or weather.

Electrical System Installation

1. Wiring the Solar Panels

- **Connect Panels in Series/Parallel**: Depending on the system design, connect the solar panels in either series or parallel. Use UV-resistant cables and connectors to ensure long-term reliability.

- **Run the Cables**: Route the wires from the panels down through the carport’s frame to a central electrical box or inverter location. Secure the cables with cable ties or conduit to prevent exposure to the elements.

2. Install the Inverter

- **Mount the Inverter**: Position the inverter in a shaded, well-ventilated location. Ensure it is mounted at a height that allows for easy access.
- **Connect to Solar Panels**: Connect the DC cables from the solar panels to the inverter's DC input terminals. Follow the manufacturer’s wiring diagram to ensure the correct configuration.

3. Connect the System to the Electrical Grid (Grid-Tied Systems)

- **Install an Electrical Panel**: Install a dedicated electrical panel for the solar system with proper disconnects and circuit breakers.
- **Grid Connection**: If the system is grid-tied, connect the AC output from the inverter to the utility grid via the breaker panel. The connection should be done by a licensed electrician to comply with local electrical codes.

4. Testing the System

- **Power Up**: After all electrical connections are made, turn on the inverter and check for proper operation. The inverter should begin to convert DC power from the panels into AC power, which can then be used by the building or fed back into the grid.
- **Check Voltage and Current**: Use a multimeter to check the output voltage and current to ensure the system is functioning correctly.

5. Inspection and Commissioning

- **Final Inspection**: Have a licensed electrician or solar technician inspect the installation to ensure it complies with local electrical codes, building codes, and safety standards.
- **System Monitoring**: If applicable, set up monitoring tools (either through the inverter or a separate app) to track the performance of the solar system.
- **Sign-off**: Obtain the final approval from local authorities or utility companies for grid connection, if necessary.

6. Tools and Equipment

S.NO.	TOOL/EQUIPMENT

1	Spanners / Hand tools	
2	Level indicator, Plumb bob, Spirit level, Inclinometer, L-square	
3	Measuring Tape	
4	PPEs-Safety Gloves, helmet, shoes, ear plug & jacket	
5	Torque wrench (30Nm – 70Nm)	

6	Total Station	
7	Auto level	
8	Tamping Rod/ Needle Vibrator(20mm)	
9	Piano-Wire	

Completion

1. Clean the Site

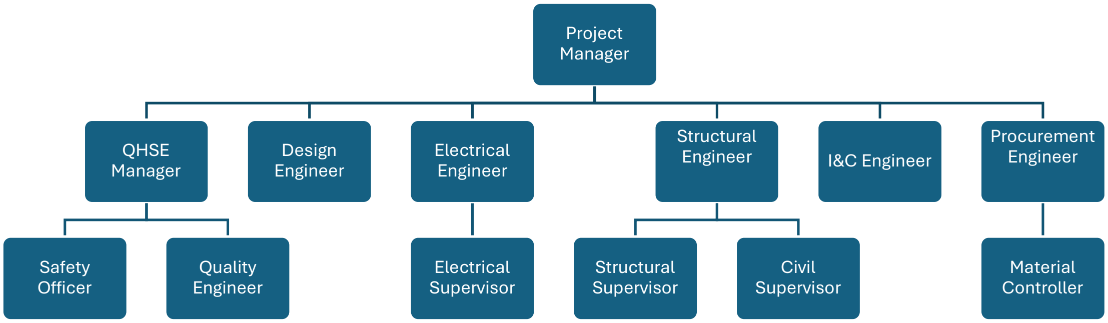
- **Remove Debris**: Clean up the installation site by removing all leftover materials, tools, and construction debris.
- **Test Carport Functionality**: Test the carport's structural integrity, checking that all beams, posts, and panels are secure.

2. Final Review

- **Provide Documentation**: Offer the system's operational manual, maintenance guidelines, and warranty information to the client.
- **System Handover**: Demonstrate the system's operation to the client, explaining how the solar panels generate energy, how to monitor performance, and maintenance requirements.

5. Project Organization

5.1. Project Organization Chart.



1.1.Roles And Responsibilities

1. **Project Manager:**
   - The Project Manager shall be responsible for the implementation of this plan within his area of operations.
   - He shall ensure that this procedure reaches Project Key Personnel involved in the construction works.
   - He shall be responsible to monitor and control the project schedule in order to assure the timely execution of the works.
2. **QHSE Manager & QHSE staff:**

- The HSE Manager and HSE staff shall monitor the correct implementation of this plan via identifying the risk assessments and hazards and applying the control measures and procedures set in the HSE plan.
- Schedule and non-schedule audit.
- **Design Engineer:**
- The design engineer shall be responsible to design the Solar System and size all required components as per the standards and specifications set in the Control Agreement assuring the final production of the Solar System.
- Responsible to assure sharing the final approved revisions of the designs with the site staff in addition any changes which may occur later.

3. **Electrical & Structural Sites Engineers/Supervisors:**
    - Will be responsible to execute the works on site as per the approved designs and standards within the time frame and quality required.
    - Will be responsible to report any delays on the works within his field of operations and take the corrective measures accordingly.
    - Will be responsible to report any disconformity of the executed works and take the corrective measures to solve.
4. **I&C Engineer:**
    - Responsible to design and implement the required SCADA system to monitor the performance of the Solar plant, in addition, abide with the requirements set by the SEC
    - Responsible to execute all cold and hot tests required with SEC and Independent Engineer required to reach the Commercial Operation of the Solar Plant.
5. **Procurement Engineer:**
    - Responsible negotiate and set all purchase orders for the materials required to complete the execution of the project with the related suppliers as per contract specifications.
    - Responsible to coordinate and facilitate the shipping and clearance of the procured materials.
    - Responsible to coordinate and facilitate the delivery of the materials to site as per the project schedule.
6. **Material Controller:**
    - Responsible to receive, arrange and store the materials in the site storage area.
    - Responsible of material handing inside site storage area.
    - Responsible of keeping records of the quantity and the status of the materials.
    - Responsible to report any material disconformity.
    - Responsible to issue materials to site staff and keep records of the same.